

The Fuel Cell Core Research Program at LANL

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INTRODUCTION

Over the past two years, the Los Alamos Fuel Cell Core Research Program has divided its efforts between research and development of polymer electrolyte fuel cells (PEFCs) fueled by reformed methanol or other liquid fuels, and polymer electrolyte fuel cells directly fueled by methanol (DMFCs). Independent of the fuel, the objectives of the core research program have always been (1) to increase the efficiency and power density of polymer electrolyte fuel cells operating under realistic conditions, (2) to reduce their intrinsic cost, (3) to achieve stable, efficient, long-term operation, and (4) to advance the capability to mass manufacture these devices. The key elements of the program --electrocatalyst and electrode optimization, bipolar plate and flow field optimization, cell endurance testing, advanced membrane development and characterization, microscopic modeling, fuel processing, system performance optimization and evaluation -- continue to be appropriate as we investigate hydrogen/air, reformat/air or direct methanol fuel cells. A fuel stream clean-up effort, including on-board liquid hydrocarbon reforming project and a fuel cell system testing and evaluation effort, started in FY-96, represents a new thrust for the Core Research Program.

An important component of our continuing fuel cell development effort is the transfer of Core Research Program technology to industry. This is being accomplished through informal interactions with industrial representatives, semi-formal collaborations involving exchange of information and components such as membranes or catalysts, and formal interactions through Cooperative Research and Development Agreements. We are specifically focusing in these efforts on collaborations with suppliers for OTT fuel cell stack development and demonstration programs.

For FY96, Los Alamos had the following primary R&D projects under the Core Research Program:

- * Improved CO Tolerance and fuel stream cleanup**
- * Low Cost, High Performance Stack Materials**
- * Improved MEA Humidification Schemes**
- * Direct Methanol Oxidation Fuel Cells**

More detail on each of these proposed activities is provided in the following.

Project 1: Improved CO Tolerance and Fuel Stream Cleanup

Task 1A - Improved CO tolerance through advanced anodes and modified fuel cell operation conditions